REMARKS

Claims 1-18 are all the claims presently pending in the application.

Claims 1, 2, 4, 8, and 11 have been amended to define more clearly the features of the claimed invention in conformance with U.S. patent practice.

Claims 12-18 have been added to claim additional features of the invention. No new matter is added.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeishi (U.S. Patent No. 6,778,038) in view of Onishi (U.S. Patent No. 5,459,368).

This rejection is respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

In a conventional duplexer using a conventional piezo-electric resonator, a transmission side filter and a reception side filter are made into respective packages. The respective packages are contained in a package for an electric circuit substrate to form the duplexer. However, small size cannot be sufficiently obtained in the conventional duplexer.

Other conventional piezo-electric resonator have been mounted on a packaging substrate by a face-down bonding of a flip-chip using bumps such that the duplexer can

be made small in height, because the flip-chip bonding uses no wire that forms a loop and therefore needs a height to some extent.

However, in conventional devices, no consideration has been given to the reliability in mounting, such as precision of positioning in the face-down bonding and the like, or the reliability in operation, such as changes of frequency characteristics and the like.

The claimed invention, on the other hand, provides an electronic component including a piezo-electric resonator utilizing a bulk wave propagating through a piezo-electric film. The piezo-electric resonator is capable of advantageously being made small in size, and thus, can be used in a duplexer for separating a transmission signal and a reception signal, for example, in a portable wireless communication apparatus.

For example, the Applicants have recognized that, when the distance L1 (e.g., see Figures 2 and 3; *all reference numerals herein being used for the Examiner's clarity only and not for limiting the claims*) between a surface of the piezo-electric resonator 10 facing the packaging substrate 19 and a surface of the packaging substrate 19 facing the piezo-electric resonator 10 is not larger than 100 μm, the junction positions of the bumps 18 in the packaging substrate 19 have swerved from the predetermined positions only by ± 7 μm.

Applicants have recognized that, in view of the relation between the distance L1 and a swerve of the position of the bumps, the distance L1 is determined to be preferably not larger than 100 μm, as exemplarily defined by independent claim 1. Accordingly, precision of positioning becomes better in the face-down bonding and the reliability of mounting can be improved in the face-down bonding (e.g., see specification at page 8, lines 4-18).

On the other hand, Applicants also have recognized that, when a maximum diameter L2 of the bumps 18 after the bumps 18 formed on the piezo-electric resonator 10 have been junctioned on the packaging substrate 19 preferably is not larger than 150 μm (as exemplarily defined by independent claim 2), a pad having an area of 165 × 165 μm^2 is located on the piezo-electric resonator 10 with respect to one bump 18. Subsequently, in order to form the eight bumps 18, eight pads each having the area of 165 × 165 μm^2 are located on the piezo-electric resonator 10. As a result, the piezo-electric resonator 10 has a size of 1 × 1.7 mm^2 including a portion of a filter. Consequently, a crack was generated in a portion of the element substrate 11 on which the one bump 18 is located in only approximately three percentages of the piezo-electric resonators 10.

Thus, with respect to the maximum diameter L2 and a size of the piezo-electric resonator 10, from the view point of area efficiency and a possibility of generation of the cracks, Applicants have recognized that the maximum diameter L2 preferably should not be larger than 150 μm, as exemplarily defined by independent claim 2 (e.g., see specification at page 9, lines 25-29).

Moreover, Applicants also have recognized that, when the distance L3 between a surface of the piezo-electric resonator 10 facing the lid 21 and a surface of the lid 21 facing the piezo-electric resonator 10 is not larger than 150 μm, the center frequency of the piezo-electric resonator 10 was only varied by approximately 0.1 percentage among approximately five percentages of the piezo-electric resonators 10. Accordingly, Applicants have recognized that the distance L3 preferably is not larger than 150 μm, as exemplarily defined by independent claim 4 (e.g., see specification at page 10, lines 18-29).

II. THE PRIOR ART REJECTION

Claims 1-11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeishi in view of Onishi.

The Examiner alleges that the combination of Takeishi and Onishi teaches or suggests all of the features of the claimed invention. Applicants respectfully submit, however, that there are features of the claimed invention which are not disclosed or suggested by Takeishi and Onishi, either individually or in combination. Therefore, Applicants respectfully traverse this rejection.

Independent claim 1

First, the Examiner alleges that Figures 2 and 11-13 of Takeishi discloses "*the structure of a piezoelectric bulk resonator flip-chip mounted to a substrate using bumps #21 that are typically 5μm*" (see Takeishi at column 10, line 7).

However, Applicants respectfully submit that the Examiner has incorrectly characterized column 10, line 7, of Takeishi.

The sentence cited by the Examiner at column 10, line 7, of Takeishi, considered in its entirety, clearly states that "*the portions of the electrodes 13A, 13B, and 15, at which the bumps 21 are formed, each have a thickness of about 5 μm*" (emphasis added).

That is, the portions of the electrodes 13A, 13B, and 15 each have a thickness of about 5μm, not the bumps 21.

In comparison, independent claim 1 recites, *inter alia*, that "*a distance between a surface of said piezo-electric resonator facing said packaging substrate and a surface of said packaging substrate facing said piezo-electric resonator being not larger than 100 μm*" (emphasis added).

According to the claimed invention as exemplarily defined by independent claim 1, precision of positioning becomes better in the face-down bonding and the reliability of mounting can be improved in the face-down bonding (e.g., see specification at page 8, lines 4-18).

Thus, for at least this reason, the cited portion of Takeishi being relied upon by the Examiner clearly does not disclose or suggest that which it is being relied upon to show. Thus, the Examiner's alleged combination of Takeishi and Onishi clearly fails to disclose or suggest all of the features of independent claim 1.

That is, Takeishi and Onishi, either individually or in combination, do not disclose or suggest at least that "*a distance between a surface of said piezo-electric resonator facing said packaging substrate and a surface of said packaging substrate facing said piezo-electric resonator being not larger than 100 μm*", as recited in claim 1 (emphasis added).

For the foregoing reasons, independent claim 1 clearly is not rendered obvious from Takeishi and Onishi, either individually or in combination.

Independent claim 2

With respect to independent claim 2, Applicants respectfully submit that the Examiner has not addressed (or mentioned) the features of independent claim 2 in the present Office Action. Thus, the Office Action clearly fails to establish a *prima facie* case of obviousness with respect to claim 2.

Applicants note that claim 2 recites, *inter alia*, that "*a maximum diameter of said electrically connected projecting portion being not larger than 150 μm when said electrically connected projecting portion is connected to said packaging substrate*" (emphasis added).

The Office Action does not address (or mention) *how* or *where* Takeishi and Onishi, either individually or in combination, disclose or suggest all of the features of independent claim 2.

Thus, on its face, the Office Action fails to establish a *prima facie* case of obviousness with respect to at least independent claim 2.

For the foregoing reasons, independent claim 2 clearly is not rendered obvious from Takeishi and Onishi, either individually or in combination.

Should the Examiner maintain this rejection, Applicants respectfully request that the Examiner properly establish the motivation for combining Takeishi and Onishi to arrive at claim 2, that a reasonable expectation of success would have been expected, and that the alleged combination teaches or suggests each and every limitation of independent claim 2.

Claim 3

As a preliminary matter, Applicants submit that claim 3 clearly is not rendered obvious from the alleged combination of Takeishi and Onishi, since the obviousness of independent claim 2, from which claim 3 depends, has not properly been established. Thus, Applicants submit that claim 3 is patentable over Takeishi and Onishi, either individually or in combination, by virtue of its dependency from claim 2, as well as for the combination of features recited therein.

With respect to claim 3, the Examiner alleges that the number of conductive bumps would be dictated by the number of terminals on the resonator device.

Applicants note that the present invention has recognized that the claimed "*maximum diameter of said electrically connected projecting portion being not larger than 150 μm when said electrically connected projecting portion is connected to said*

packaging substrate", as recited in independent claim 2 (emphasis added), is particularly preferable in a case that the number of electrically connected projecting portions (e.g., bumps 18) is eight (e.g., see specification at page 10, lines 1-3).

Thus, claim 3 is patentable over the cited references by virtue of its dependency from claim 2, as well as for the additional features recited therein.

Applicants submit that the combination of elements recited in claim 3 would not have been obvious over Takeishi and Onishi, either individually or in combination.

Independent claim 4

With respect to independent claim 4, Applicants respectfully submit that the Examiner has not addressed (or mentioned) the features of independent claim 4 in the present Office Action. Thus, the Office Action clearly fails to establish a *prima facie* case of obviousness with respect to claim 4.

Applicants note that claim 4 recites, *inter alia*, that "*a distance between a surface of said piezo-electric resonator facing said sealing member and a surface of said sealing member facing said piezo-electric resonator being not larger than 150 μm*" (emphasis added).

The Office Action does not address (or mention) *how* or *where* Takeishi and Onishi, either individually or in combination, disclose or suggest all of the features of independent claim 4.

Thus, on its face, the Office Action fails to establish a *prima facie* case of obviousness with respect to at least independent claim 4.

Moreover, the Examiner specifically acknowledges that Takeishi does not explicitly provide a cover, which the Examiner appears to compare to the claimed "*sealing member*", as recited in claimed invention.

However, the Examiner alleges that Onishi makes up for the acknowledged deficiencies of Takeishi by providing a housing to protect and shield a flip-chip mounted piezo-electric resonator. Thus, the Examiner asserts that it would have been obvious to provide a cover for Takeishi.

Applicants respectfully submit, however, that the Examiner has not identified any teaching in Onishi, which the Examiner relies on for the claimed "*sealing member*", for the claimed "*distance between a surface of said piezo-electric resonator facing said sealing member and a surface of said sealing member facing said piezo-electric resonator being not larger than 150 μm*", as recited in independent claim 4 (emphasis added).

That is, even assuming *arguendo* that it would have been obvious to combine Takeishi and Onishi, as alleged by the Examiner, neither Takeishi nor Onishi discloses or suggests "*a distance between a surface of said piezo-electric resonator facing said sealing member and a surface of said sealing member facing said piezo-electric resonator being not larger than 150 μm*", as recited in independent claim 4 (emphasis added).

For the foregoing reasons, independent claim 4 clearly is not rendered obvious from Takeishi and Onishi, either individually or in combination.

Should the Examiner maintain this rejection, Applicants request that the Examiner properly establish the motivation for combining Takeishi and Onishi to arrive at claim 4, that a reasonable expectation of success would have been expected, and that the alleged combination teaches or suggests each and every limitation of independent claim 4.

Claim 5

As a preliminary matter, Applicants submit that claim 5 clearly is not rendered obvious from the alleged combination of Takeishi and Onishi, since the obviousness of independent claim 4, from which claim 5 depends, has not properly been established.

Thus, Applicants submit that claim 5 is patentable over Takeishi and Onishi, either individually or in combination, by virtue of its dependency from claim 4, as well as for the combination of features recited therein.

With respect to claim 5, Applicants respectfully submit that the Examiner has not addressed (or mentioned) the features of claim 5 in the present Office Action. Thus, the Office Action clearly fails to establish a *prima facie* case of obviousness with respect to claim 5.

Applicants note that claim 5 recites, *inter alia*, that the "*surface of said piezo-electric resonator facing said sealing member and said surface of said sealing member facing said piezo-electric resonator are coupled with each other*" (emphasis added).

The Office Action does not address (or mention) *how* or *where* Takeishi and Onishi, either individually or in combination, disclose or suggest all of the features of claim 5.

Thus, on its face, the Office Action fails to establish a *prima facie* case of obviousness with respect to at least claim 5.

Moreover, even assuming *arguendo* that it would have been obvious to combine Takeishi and Onishi, as alleged by the Examiner, neither Takeishi nor Onishi discloses or suggests that the "*surface of said piezo-electric resonator facing said sealing member and said surface of said sealing member facing said piezo-electric resonator are coupled with each other*", as recited in claim 5 (emphasis added).

For the foregoing reasons, claim 5 clearly is not rendered obvious from Takeishi and Onishi, either individually or in combination.

Should the Examiner maintain this rejection, Applicants request that the Examiner properly establish the motivation for combining Takeishi and Onishi to arrive at claim 5,

that a reasonable expectation of success would have been expected, and that the alleged combination teaches or suggests each and every limitation of claim 5.

Claim 6

As a preliminary matter, Applicants submit that claim 6 clearly is not rendered obvious from the alleged combination of Takeishi and Onishi, since the obviousness of independent claim 4, from which claim 6 depends, has not properly been established.

Applicants submit that claim 6 is patentable over Takeishi and Onishi, either individually or in combination, by virtue of its dependency from claim 4, as well as for the combination of features recited therein.

Claim 7

As a preliminary matter, Applicants submit that claim 7 clearly is not rendered obvious from the alleged combination of Takeishi and Onishi, since the obviousness of independent claim 4, from which claim 7 depends, has not properly been established.

Applicants submit that claim 7 is patentable over Takeishi and Onishi, either individually or in combination, by virtue of its dependency from claim 4, as well as for the combination of features recited therein.

Turning to the language of claim 7, claim 7 recites, *inter alia*, that "*a buffer is located for burying a space between said piezo-electric resonator and said sealing member*" (emphasis added).

The Office Action does not address (or mention) *how* or *where* Takeishi and Onishi, either individually or in combination, disclose or suggest all of the features of claim 7.

Thus, on its face, the Office Action fails to establish a *prima facie* case of obviousness with respect to at least independent claim 7.

For the foregoing reasons, claim 7 clearly is not rendered obvious from Takeishi and Onishi, either individually or in combination.

Should the Examiner maintain this rejection, Applicants request that the Examiner properly establish the motivation for combining Takeishi and Onishi to arrive at claim 7, that a reasonable expectation of success would have been expected, and that the alleged combination teaches or suggests each and every limitation of claim 7.

Claims 8 and 9

As a preliminary matter, Applicants submit that claims 8 and 9 clearly are not rendered obvious from the alleged combination of Takeishi and Onishi, since the obviousness of independent claim 1, from which claims 8 and 9 depend, has not properly been established. Thus, claims 8 and 9 are patentable over Takeishi and Onishi, either individually or in combination, by virtue of their dependency from claim 1, as well as for the combination of features recited therein.

Turning to the language of these claims, claim 8 recites, *inter alia*, that "*said buffer comprises an adhesive for fixing said piezo-electric resonator and said sealing member*" (emphasis added).

The present application clearly describes that the reliability of mounting the piezo-electric resonator can be improved, according to the claimed invention (e.g., see specification at page 11, lines 8-11).

On the other hand, claim 9 recites, *inter alia*, that "*said electrically connected projecting portion comprises gold*" (emphasis added).

The present application clearly describes that the use of gold reduces (e.g., prevents) scattering of fluxes and remaining impurities, such as melted flux of the washing solution after the washing process (e.g., see specification at page 6, lines 9-15).

The Office Action does not address (or mention) *how* or *where* Takeishi and Onishi disclose or suggest all of the features of claims 8 and 9.

Thus, on its face, the Office Action fails to establish a *prima facie* case of obviousness with respect to at least claims 8 and 9.

For the foregoing reasons, claims 8 and 9 clearly are not rendered obvious from Takeishi and Onishi, either individually or in combination.

Should the Examiner maintain this rejection, Applicants request that the Examiner properly establish the motivation for combining Takeishi and Onishi to arrive at claims 8 and 9, that a reasonable expectation of success would have been expected, and that the alleged combination teaches or suggests each and every limitation of each of claims 8 and 9.

Claims 10 and 11

As a preliminary matter, Applicants submit that claims 10 and 11 clearly are not rendered obvious from the alleged combination of Takeishi and Onishi, since the obviousness of independent claim 1, from which claims 10 and 11 depend, has not properly been established.

Applicants submit that claims 10 and 11 are patentable over Takeishi and Onishi, either individually or in combination, by virtue of their dependency from claim 1, as well as for the combination of features recited therein.

For the foregoing reasons, Takeishi and Onishi, either individually or in combination do not disclose or suggest all of the features of the claimed invention.

Therefore, the Examiner is requested to reconsider and withdraw this rejection and to permit claims 1-11 to pass to immediate allowance.

III. NEW CLAIMS

New claims 12-18 have been added to claim additional features of the invention. No new matter is added.

Claims 12-18 are patentable over the prior art of record for somewhat similar reasons as those set forth above.

IV. FORMAL MATTERS AND CONCLUSION

Applicants note that the Examiner cites several additional references at page 3, lines 1-2, of the Office Action. However, since the Examiner has not applied these references (or provided an explanation of how or why such would be combined with the other references), Applicants have not addressed these references. Applicants reserve the right to traverse these references should the Examiner later apply these references against the claims.

Applicants respectfully request that the Examiner acknowledge Applicants' claim to foreign priority under 35 U.S.C. § 119 and indicate that all of the certified copies of the priority document have been received by checking the appropriate boxes 12(a)(1) of the Office Action Summary.

In view of the foregoing, Applicants submit that claims 1-18, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone

number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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